

CLAIMS

What is claimed is:

1. An apparatus for recording and playing back a video stream, herein referred to as a first video storage device, comprising:
 - a video interface configured to receive or transmit a video stream;
 - a network communications interface;
 - a data storage unit configured to retain video content;
 - a computer processor configured to control the recording of video content to, and the playing back of video content from, said data storage unit through said video interface; and
 - means for automatically transferring video content over said network communications interface between said first video storage device to, or from, at least a second video storage device to redistribute available video content storage space.
2. An apparatus as recited in claim 1, wherein said means for transferring content comprises:
 - programming executable by said computer processor for carrying out the operations of
 - detecting if available storage space on said first video storage device is less than a minimum value, and
 - transferring video content from said first video storage device to said second video storage device if said available storage space on said first video storage device is less than said preferred minimum value.
3. An apparatus as recited in claim 2, wherein said minimum value of available content storage space is measured as a parameter selected from the group of storage space sizing units consisting essentially of a playback time value, a memory quantity value, and a proportion value.

4. An apparatus as recited in claim 1, wherein said means for transferring content comprises:

programming executable by said computer processor for carrying out the operations of

detecting that content storage space availability has increased above a threshold value on a first video storage device, and

communicating said increase in available content storage space on said first video storage device to other video storage devices which can commence a transfer of video content to said first video storage device.

5. An apparatus for recording and playing back a video stream, referred to as a first video storage device, comprising:

a video interface configured to receive or transmit a video stream;

a network communications interface;

a data storage unit configured to retain video content;

a user interface configured to receive recording and playback commands from a user;

a computer processor configured to control the recording and playback of content from said first video storage device in response to user commands, and user selected recording schedules configured to communicate with other content recording and playback devices through said network communications interface; and

programming executable by said computer processor for carrying out the operations of

detecting if a sufficient change in the available content storage space has occurred on said first video storage device,

receiving content space availability information from a second video storage device through said network communications interface, and

transferring video content in either direction between said first video storage device and said second video storage device if content distribution can be improved.

6. An apparatus as recited in claim 5, wherein said video interface comprises:
- a video input interface configured for receiving video content; and
 - a video output interface configured for communicating video content to a video display or video recording device.
7. An apparatus as recited in claim 6, wherein said first video storage device is configured to retain video content received from said video input interface and to communicate video content through said video output interface.
8. An apparatus as recited in claim 5, wherein said network communications interface is configured for connection to a network upon which other recording or playback devices can be connected and over which video streams may be communicated.
9. An apparatus as recited in claim 5:
- wherein the sufficient change is detected by determining that the available content storage space has crossed a threshold value;
 - wherein said threshold value can be adjusted according to user preferences;
 - wherein said threshold value can adjust automatically in response to changes in the recording schedule.
10. An apparatus as recited in claim 5, wherein said threshold value is measured as a parameter selected from the group of storage measurement units consisting essentially of a playback time value, a memory quantity value, and a proportion value.
11. An apparatus as recited in claim 5, further comprising means for performing content deletions within a first video storage device in response to communication of content storage needs from other video storage devices over said network.

12. An apparatus for recording and playing back a video stream, and referred to as a video storage device, comprising:

- a video interface configured to receive or transmit a video stream;
- a data storage unit configured to retain video content;
- a user interface configured to receive record and playback commands from a user;
- a computer processor configured to control recording and playback of video content from said data storage unit in response to said user commands; and
- means for removing video content displayed on a play list, and for deferring release of associated storage space on said video storage device until said storage space is needed for recording additional content.

13. An apparatus as recited in claim 12, wherein said means for removing video content comprises:

- programming executable by said computer processor for carrying out the operations of
 - receiving a directive to delete content from within said play list;
 - moving pointers to said content from said play list to a replacement queue, within which units of content storage remain associated with their respective element of content until reused for recording additional content.

14. An apparatus as recited in claim 13, wherein said directive to delete content comprises a user command received through said user interface or a directive from programming for performing automated content deletion.

15. An apparatus as recited in claim 14, wherein said programming for performing automated content deletion is executed in response to status information about the video content.

16. An apparatus as recited in claim 14, wherein said programming for performing automated content deletion is executed in response to user preference settings or information.

17. An apparatus as recited in claim 16, wherein said user preference information is received from a user preference engine.

18. An apparatus as recited in claim 12, further comprising means for restoring video content removed from said play list but whose video storage space has not been fully reallocated to other content, said restored video content being returned to said play list in response to an undeletion command from said user.

19. An apparatus as recited in claim 18, wherein said means for restoring video content comprises:

programming executable by said computer processor for carrying out the operations of

receiving a user command to undelete content previously deleted from said play list, and

moving pointers to remaining portions of content from said replacement queue back into said play list.

20. A method of redistributing content within a networked video recording device, comprising:

determining automatically that a sufficient change in the availability of video content storage space has occurred in a first networked video recording device;

transferring video content over the network between said first networked video recording device and a second networked video recording device in response to said determination of the change in content space availability; and

marking said content for deletion from the play list of the networked video recorder from which the video content was transferred.

21. A method as recited in claim 20, wherein said determining that a sufficient change in video content storage space has occurred comprises detecting that the available video content storage space has dropped below a threshold value.

22. A method as recited in claim 20, wherein said determining that a sufficient change in video content storage space has occurred comprises detecting that the available video content storage space has increased above a threshold value.

23. A method as recited in claim 22, further comprising communicating the increase in available video content storage space over the network with other video recording devices which have video content to be transferred.

24. A method of redistributing content within a networked video recording device, comprising:

- tracking the amount of available content storage space within a video recording device;

- determining that a sufficient change in the availability of content storage space has occurred on a first video recording device;

- establishing communication with other video recording devices adapted for content storage and retrieval over said network;

- determining content space availability within said other devices;

- determining which content is to be transferred in either direction between said first video recording device and other video recording devices;

- establishing programmatic references to content that is to be transferred between video recording devices;

- copying data in either direction from between said first video recorder device and said other video recorder device over said network;

- verifying that the copy operation has completed successfully; and

- marking content for deletion on the video recorder device from which the content was successfully copied.

25. A method as recited in claim 24, wherein said tracking of the available content storage space comprises determining the amount of available storage space registered as a recording time value.

26. A method as recited in claim 24, wherein said tracking of the available content storage space comprises determining the amount of available storage space as a percentage of total content space that remains available for use.

27. A method as recited in claim 24, wherein determining the insufficiency of remaining content space comprises:

comparing the available content space with at least one fixed or variable content space threshold; and

determining that less content space is available than given by said fixed or variable content space threshold.

28. A method as recited in claim 27, wherein said content space threshold is responsive to entries made in a recording schedule.

29. A method as recited in claim 27, wherein said content space threshold is responsive to historical information about recording performed with said video recorder device.

30. A method as recited in claim 24, wherein said determination of which content is to be moved is responsive to user preference settings or user preference information from a user preference engine.

31. A method as recited in claim 24, wherein establishing programmatic references to said content comprises loading one or more pointers to blocks of data containing said content and subject to transfer over said network.

32. A method of allowing restoration of media content deleted from a video recording device, comprising:

receiving a directive to delete media content from within the play list of a video recorder device;

moving pointers to said content from said play list to a replacement list;

maintaining the association between said content and units of data storage

upon which said content is recorded unless said units of data are needed to record additional content;

receiving a user command to undelete said content from within said replacement list of said personal video recorder; and

moving pointers to said content, for which at least some units of data storage remain associated, from said replacement list to said play list in response to said undelete command.

33. A method as recited in claim 32, wherein said directive to delete content comprises a user command received through a user interface for said video recorder device or a directive from programming for performing automated content deletion.

34. A method as recited in claim 33, wherein said programming for performing automated content deletion is executed in response to status information about the video content.

35. A method as recited in claim 33, wherein said programming for performing automated content deletion is executed in response to user preference settings or information.

36. A method as recited in claim 35, wherein said user preference information is received from a user preference engine.

37. A method of allowing restoration of media content to a play list within a video recorder device subsequent to deletion, comprising:

removing an element of video content from a play list of a video recorder and entering it into a replacement list in response to a video content deletion directive associated with a command received from a user, or programming that performs automated deletion;

deferring release of the content storage space upon which elements of said video content within said replacement list are recorded, until said content storage

space is needed for recording additional video content;

releasing sufficient contentstorage space upon which an element of video content is recorded within said replacement list, in response to recording of new video content within said video recording device; and

restoring an element of video content, for which at least a portion of said contentstorage space has not been released, from said replacement list to said play list in response to an undelete command, directed at said content element within said replacement list, as received from said user.